SCIENCE

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MSS. intended for publication and books, etc., intended for review should be sent to the responsible editor, Professor J. McKeen Cattell, Garrison-on-Hudson, N. Y.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

DETAILS additional to those already published in SCIENCE have been sent out regarding the approaching anniversary meeting of the Association. The Rogers Building of the Massachusetts Institute of Technology will be the headquarters of the Association, and the preliminary meeting of the Council will be held there at noon on Saturday, August 20th. The Copley Square Hotel has been chosen as hotel headquarters. The first general session of the Association will be held at 10 a. m. on Monday, August 22d. The meeting will be called to order by the retiring President, Professor Wolcott Gibbs, who will introduce the President-elect, Professor F. W. Putnam. Addresses of welcome will be made by his Excellency Roger Wolcott, Governor of Massachusetts; His Honor Josiah Quincy, Mayor of Boston, and President James M. Crafts, of the Massachusetts Institute of Technology, and President Putnam will reply.

In the afternoon the addresses of the Vice-Presidents of the Association will be made before the Sections as follows:

At half-past two o'clock. Vice-President Whitman, before the Section of Physics: 'On the Perception of Light and Color;' Vice-President Cattell, before the Section of Anthropology: 'The Advance of Psychology;' Vice-President Farlow, before the Section of Botany: 'The Conception of Species as Affected by Recent Investigations on Fungi.'

At half-past three o'clock. Vice-President Barnard, before the Section of Mathematics and Astronomy: 'Development of Astronomical Photography;' Vice-President Blue, before the Section of Social and Economic Science: 'The Historic Method in Economics;' Vice-President Packard, before the Section of Zoology: 'A Half-century of Evolution, with Special Reference to the Effects of Geological Changes on Animal Life.'

At half-past four o'clock. Vice-President Smith, before the Section of Chemistry: subject to be announced; Vice-President Fairchild, before the Section of Geology and Geography: 'Glacial Geology in America;' Vice-President Cooley, before the Section of Mechanical Science and Engineering: subject to be announced.

On Monday evening Professor Wolcott Gibbs will make the address of the retiring President, his subject being 'On Some Points in Theoretical Chemistry.' President Eliot will address the Association at Harvard University on Friday evening, and it is expected that illustrated lectures will be given on Wednesday evening on the Boston Park System and the Metropolitan Water Supply and Sewage System.

The scientific work of the sections will be practically confined to two days, Tuesday and Thursday, excursions having been arranged for Wednesday, Friday and Saturday. As we have already stated, the excursion on Wednesday will be to Salem, where the Association will be the guest of the Essex Institute, while on Friday it will be the guest of Harvard University by invitation of the President and Fellows. On Saturday excursions have been arranged to Riverside, Wellesley, Concord and Lexington; various excursions have also been planned to follow the close of the meeting.

THE BREEDING OF ANIMALS AT WOODS HOLL DURING THE MONTH OF MAY, 1898.

The opening of the Biological Laboratory of the United States Fish Commission made it possible for a number of naturalists to work at Woods Holl during the month of May, and it is hoped that the abundance of animal life may attract others to the shore in 1899.

The temperature of the water during the month of May rapidly rose from 46 to 57 F. To this remarkable physical change both the fauna and flora responded, and the biological facies were materially altered.

Vertebrates.—The winter forms gradually disappeared and the familiar types of the warmer months began to arrive. The lampreys (*Petromyzon marinus*), ripe with eggs, were taken during the latter part of the month at East Taunton. Spiny dogfish (*Squalus acanthias*) were taken in Vineyard Sound, and *Raja ocellata* was abundant throughout the month, though probably not breeding. The transparent young of the common eel were frequently taken on the surface and in the shallow water. The fishermen say that the adults descend the streams while the alewives are passing up. This migration to the sea happens about the 12th, when there is the heaviest run, although many may be taken on subsequent nights. If the sky is clear and cloudless the catch is never so large as when dark and stormy. Late in the month several barrels of menhaden (*Brevoortia tyrannus*) were taken at Cuttyhunk, while throughout the month the skimming-net caught multitudes of young herring (*Clupea harengus*). *Fundulus heteroclitus*, ripe with eggs, was captured in great numbers at Falmouth on the 13th, where were also found two species of stickleback (*Gasterosteus bispinosus* and *Apeltes quadracus*), both sexually mature. An abundance of breeding pipe-fish (*Siphostoma fuscum*) were seined from eel-grass on May 13th, and they have been found, with pouches filled with eggs, as late as July 13th. The first mackerel (*Scomber scombrus*) was taken on May 3rd. A few butter-fish (*Rhombus triacanthus*) were taken in a trap at Cuttyhunk on the 11th, though reported at West Dennis on the 5th. They spawn in June.

Among the Serranidæ, *Roccus lineatus* usually arrives in May, although the present year we did not secure specific data. The white perch (*Morone americana*) spawns during this and the following month, and the sea-bass (*Centropristes striatus*), first seen on the 10th, was taken in large numbers on the 12th. It spawns in June. The scup (*Stenotomus chrysops*) were abundant at Cuttyhunk on the 11th, when thirty barrels were taken. It is said to spawn early in June. The squeteague (*Cynoscion regalis*), first taken in April, was occasionally brought to the station in May. The puffers (*Spheroides maculatus*) appeared during the latter part of the month, and a fine lumpfish (*Cyclopterus lumpus*) was also captured. The latter is said to breed in April. The Gurnards were represented by both *Prionotus carolinus* and *Prionotus strigatus*. It is estimated that there were at least one thousand in the trap on the 13th. Specimens examined on the 16th were not ripe, though the ovaries were large.

The Gadidæ abounded. Beautiful great pollock were almost daily brought to the laboratory; cod were so numerous that they found no market, and white hake (*Phycis tenuis*) were a positive annoyance to the fishermen. When so many inland laboratories are inadequately provided with animals for dissection it seems a great pity that hundreds of barrels of this beautiful material should yearly go to waste.

Among the Pleuronectidæ the summer flounder (*Paralichthys dentatus*) was often taken. The four-spotted flounder (*Paralichthys oblongus*) and the window-pane (*Bothus maculatus*) were abundant. Eggs of the four-spotted flounder were ripe in May, and have been hatched in the Chester jars. The period of incubation is about eight days. The eggs of the window-pane are of about the same size as those of *P. oblongus* and readily fertilize. The good eggs soon rise to the surface, leaving the immature and injured eggs at the bottom. The sole (*Achirus fasciatus*) was apparently ripe the latter part of the month. *Lophius* was abundantly taken from the 'Sound' traps on the shore of Marthas Vineyard.

Molgula and *Ciona* were ripe throughout the month.

Crustacea.—*Gammarus annulatus* occurred in swarms. The tow-net at one haul, on the 16th, contained over two quarts, and the animals were so numerous that in places they gave a distinct color to the water. Many had eggs. On the 23d they were only occasionally found. *Orchestia agilis* bears eggs in May, and is, of course, abundant. When *Cyanea* comes to Woods Holl in May, it is often accompanied by *Hyperia*; the crustacean bears at this time most beautiful great eggs, almost perfectly transparent. On May 6, 1892, many were collected at Woods Holl, and on June 8, 1893, they were abundant in Narragansett Bay. *Idotea* was found at Nahant with eggs, May 20, 1893.

Schizopods, adults laden with eggs and young, were daily taken. Lobsters began to hatch on the 16th, and thousands were planted in Vineyard Sound during the latter part of the month. *Crangon* was often heavy with young, though *Palæmonetes* did not deposit its eggs until the latter part of the month. *Eupagurus longicarpus* was found bearing well-developed eggs on May 9, 1890, and on May 16th the eyes of the embryos could be seen. *Carcinus granulatus* often had eggs, as did *Gelasimus* and *Libinia*. The crabzœa were first taken in the skimmings on the 10th, and were abundant on the 11th. *Hippa*, though often taken, was without eggs. Pairs of *Limuli* might have been collected by the hundred.

Vermes.—The tow-net brought in many surface forms. On the 7th *Autolytus* was taken, but without eggs. On the 10th several egg-bearing individuals were noted, and on the 11th Dr. Mead saw a male

swim about like an excited *Nereis limbata* and finally fasten to one of the females with his jaw. Throughout the latter portion of the month *Autolytus* was taken in abundance. On May 17th swarms of Terrebellids were observed to migrate from the clusters of *Parypha*, brought to the laboratory from Quick's Hole, and to gather on the sides of the aquaria. *Lepidonotus* bred throughout the first half of the month, and ripe females have been found as early as April 25th. Dr. Mead informs me that if the females are captured during the day they will deposit their eggs at about 6 p. m. The ripe females are generally greenish drab on the lower side, while the males are pinkish white. If the stagnant water, in which the animals have been retained during the day, is replaced by fresh sea-water the eggs or sperm will be seen to leave the nephridial openings of the posterior two-thirds of the body in streams. Since the eggs after fertilization settle to the bottom, the water may be renewed without difficulty. The embryos swim in from eight to ten hours and the gastrula stage is reached in about twenty hours. *Harmothœ*, found in the same localities as *Lepidonotus*, from which it is distinguished by having eighteen rather than twelve pairs of scales, breeds about one week earlier. The eggs may be secured and fertilized in the same way as those of *Lepidonotus*. The ripe females are bright pink on the lower side.

Dr. Mead found *Scolecolepis viridis* and *Clymenella torquata* breeding during the early part of May. The eggs of the former species are found in the sand-tubes; those of the latter are very large, but difficult to secure because of the shortness of the breeding season. Specimens absolutely ripe extrude the eggs in confinement, but if not absolutely ripe the eggs degenerate without being extruded. *Nereis limbata* was found swimming on the surface on the 13th. *Spirorbis* breeds during May, and the fully formed embryos may be shaken from the *Fucus*, to which the adults are attached. Fine large egg-bearing specimens of *Sagitta* were abundant until the middle of the month.

Dr. E. G. Gardiner reports that the small acœlous planarian, *Polychœrus caudatus*, was repeatedly found, that several examples of a large species of *Monotus*, collected near the Laboratory, laid thousands of eggs upon the walls of the glass jars in which they were confined, and that *Plagiostomum* freely laid in captivity. He also found great numbers of *Dinophilus*.

Mollusks.—The squid (*Loligo pealii*) made their appearance on May 7th, when several hundred were taken at Hadley Harbor. Many eggs in early stages of development were found, and the animals occasionally laid in the aquaria. Artificial fertilization is easily accomplished. Many squid were taken throughout the month, and one egg-mass found attached to a fish trap filled a large bucket. *Urosalpinx* was found breeding on the 21st. The sand-collars of *Lunatia* were frequently brought into the Laboratory, and naked mollusks often deposited their eggs in the aquaria.

Echinoderms.—On May 10th *Echinarachnius parma* showed no sign of exhaustion; larvæ of *Cribrella* were taken in the tow-net, and the Ophiurans, abundant at North Falmouth, contained only immature eggs. An earlier note, made at Nahant, reports *Ophiopholis* as ripe May 20, 1893.

Cœlenterates.—*Pleurobrachia rhododactyla* was not abundant. The reproductive elements were found to be ripe by Dr. McMurrich towards the end of May, 1890. *Berœ* was taken at Newport, R. I., on May 7, 1896, and at Bristol, R. I., on May 15th. *Mnemiopsis* and *Cyanea arctica* were only occasionally found. The planulæ of the latter may be easily raised in the Laboratory. They attach themselves in from seven to ten days after the eggs have left

the parent. A few *Aurelia* of medium size were taken on the 7th, and again on the 16th, 17th, 18th and 19th.

On May 10th a few small specimens of *Tubularia couthouii* were dredged at Quick's Hole, and the large stems of specimens dredged on the 17th seemed to show signs of regenerative processes. On the 11th hydromedusæ were hatched from hydroids of *Obelia*, and on the 13th a few were seen in the water around the station. *Tima formosa* was not seen during the month, though in 1896 the species was abundant in Narragansett Bay. H. C. BUMPUS.

NATURAL HISTORY MUSEUMS (II.).

THE MUSEUM AS A TEACHER.

THE museum, by an intellectual treatment of its collections, has, as I have shown already, discharged a large part of its function as a teacher. It remains for it to provide guides and lectures. The guides can be small books, leaflets or albums. The lectures are a more important feature. They are inaugurated in many museums; the series given in Washington, under the auspices of the National Government, and those given in London by the British Museum are examples illustrating this feature at its best. Lectures demand for their best popular value a combination of a firm and thorough command of the subject, a simple and yet adequate verbal exposition which may with some, according to their exceptional talent, assume a high literary quality, and lastly ample and stimulating illustration, either in slides by projection or in natural specimens. It is unnecessary to discuss the best form of a lecture. One point can be conclusively claimed, that the feature of entertainment should not expel out of all semblance of existence correct definite instruction, and that the philosophy of the topic should not be presented in broken half-truths, but envelop the listener with the penetrating atmosphere of thought.

THE MUSEUM AS AN INVESTIGATOR.

The museum completes its scope of relations to the great world of scientific interests when it uses its resources in the prosecution of original research and in publishing that which requires publicity. Biological problems are more naturally carried on in schools devoted to that subject, but the gathering of evidences and facts in natural history, facts bearing on distribution of animals, their habits and physiology, the solution of problems in ethnography and archæology, the collecting of new and valuable specimens in geology and mineralogy, the illustration of faunas and floras, description of new species, and revision of old, are topics which naturally engage the attention of the Museum of Natural History. The series of publications that have proceeded from the Smithsonian Institution, the National Museum, and the Museum of Comparative Zoology at Cambridge, form a library of research and generous compilation almost unrivalled.

THE AMERICAN MUSEUM OF NATURAL HISTORY.

In 1867 New York was without a museum. The American Academy of Arts and Sciences had in Boston brought together collections which formed a nucleus for yearly accretions, and furnished material for study and publication. In Philadelphia Franklin had unmistakably imparted, by example and a contagious influence, the spirit of research to groups of scientific minds. The American Philosophical Society and the Philadelphia Academy of Sciences by their important papers, the accumulation of a varied store of material, and the establishment of a remarkable library, furnished the most significant monument to the imperishable ardor of the great printer.

In Washington Smithson had laid the foundation of a museum and established a

bureau of publication and exchange which brought into correspondence the scientific workers of the world. In Cincinnati, a city rejoicing in a neighborbood which yields the most multifarious vestiges of a past life, a museum had been organized, and here Anthony, a pupil of the elder Agassiz, held sway over a local group of conchologists. In Albany the fruits were chiefly garnered of the classic survey of this State, that, inaugurated in 1836, marked an era in the history of geological science in this country, and deciphered an alphabet in geological formations that has been applied to all its other sections. In Chicago a museum under the genial inspirations of Stimpson had assumed mature dimensions.

There were clubs of collectors in New York, and the K. K. Club of Brooklyn is yet pleasantly remembered by its older citizens, who may have there displayed before envious eyes a rare cypræa, a precious volute, an unsurpassed cone or a unique olive. A philosophical society had, indeed, expired in New York after issuing an exhaustive claim to continued existence. The New York Lyceum succeeded it, and here Torrey, Draper, Wheatley, Redfield and Dekay created the elements of a scientific association. In 1865 its collections of considerable value were destroyed by the flames which razed to the ground the old Medical School of the University, but later it sprang into prominence under Newberry, and maintains to-day a prolific scientific vigor under the guidance of Julien, Osborn, Britton, Kemp, Dean and Doremus.

Such preparatory stages brought into notice the enthusiastic designs of Mr. Waterhouse Hawkins, an anatomist of repute and an artist whose imagination had reached an extreme point of fertility from the study of extinct forms of life. Mr. Hawkins captured the ear or the fancy of the officials of the Department of Parks, who involved their own rather mundane designs upon Manhattan Square with Mr. Hawkins' terrifying restorations, and the result of this somewhat incongruous union was to be a sort of Sydenham Palace. Here was to be a bear-pit, amphitheatrical and boundless, surrounded with caves surprisingly natural; above this was contemplated a huge circus of rock becomingly wild and impressive, while a company of beavers, beyond this Rabelaisian structure, were to build dams fast and large enough for the sensational needs of a metropolitan audience. We read in the *Evening Mail*, Wednesday, October 27, 1869: "Caves with graceful tenants will surprise at every turn, tiny cascades will tumble down the rocks, wonders of the finny tribes will glisten in miniature lake and sedgy pool, and among the shadowy foliage overhead rare birds of gorgeous plumage will talk to us in unknown tongues." At this point Mr. Hawkkins came in. There was to be a gloomy and half subterranean receptacle for his restorations, a sort of fossil catacombs wherein the visitor, suppressing his dismay and encouraging his understanding, would wander about through shapes of pre-Adamite existence, and escape again into the light of day like Marcellus and Bernardo, 'distilled almost to jelly with the act of fear.' New York was spared this unnecessary and theatrical episode.

R. L. Stuart, R. J. Steward, Theodore Roosevelt and H. Haines established the American Museum of Natural History. Professor A. S. Bickmore was associated with its very first years, having been engaged as its first Superintendent, while the venerable name of John David Wolfe as its first President, supported by a long list of prominent citizens, guaranteed it the requisite recognition in the State Legislature. Without pausing to recall the uneventful days of its inconspicuous life in the old arsenal in Central Park, I pass to that summer day in 1874 when the corner

stone of the first section of the present imposing structure was laid. I beg to quote from a paper on the Museum prepared by me in 1883: "It was in June. A large platform covered the newly-laid walls of the foundation, and above this rose their unfinished and irregular edges, inclosing a space crowded to its limits with expectant guests. A canopy over all tempered the propitious radiance of a summer sun; platoons of police kept open broad avenues of approach, and the constant roll of equipages and the occasional appearance of groups of distinguished men lent to the occasion an unusual and gala character. The scene was, in reality, not without a certain impressive and picturesque interest. Without the inclosure, the square, then broken by outcropping strata of gneiss rock and valley-like basins, was black with throngs of men for whom was then instituted a place of beneficial recreation; within, an assembly of beauty and culture, wisdom and executive prerogative, engaged in a ceremony contemplating honor solely to the genius of modern civilization."

President Grant laid the corner stone; Governor Dix spoke, and the great and wise Henry saluted it in a prophecy of mingled hope and admonition. I have elsewhere reviewed the nature and importance of the collections then displayed, and it is now auspicious, without wearying your patience, to explain the greatly changed conditions that prevail within it and its enormously expanded prospects and opportunities.

Upon the death of President Wolf Mr. R. L. Stuart succeeded to the presidency, and upon his demise, in 1882, Mr. Morris K. Jesup. It is really within the period of the latter's presidency that the Museum has entered upon the prerogatives and functions of a great museum. At the outset of an outline of the Museum's status it must be realized that in its relations to the city it is partially a tenant of the city and partially a beneficiary. The city furnishes the corporation known as the American Museum of Natural History with a building adequate for its purposes, and pays to it also an annual sum sufficient for its proper maintenance and the care of its collections. On the other hand, the corporation represented by its officers and trustees furnishes to the people of the city free access (under the reservation of two pay-days a week) to its collections, which it engages to label and display so as best to promote the instruction of its visitors. There are five scientific departments in the Museum, a library, a business and a clerical administration.

The five scientific departments cover almost entirely the area of Natural History, and embrace Forestry, Mammalogy and Ornithology, Entomology, Invertebrate Paleontology, Invertebrate Zoology, Mineralogy and Economics, Ethnography and Archæology. Objects and collections are secured by donation and purchase. The gifts which have enriched the Museum are princely. Mr. M. K. Jessup, the President, has given the exhaustive collection of American Forestry; Mr. J. Pierpont Morgan, the Tiffany collection of gems; Miss Catherine Wolf gave the Conchological Library of Dr. Jay, which is the nucleus of the present greatly enlarged collection of books. Mrs. Margaret Schuyler Elliot gave her husband's superb cabinet of bred Lepidoptera; Dean Hoffman, the exhibition collections of North and South American butterflies; James Angus, a varied collection of representative entomology; W. Schaus, the Old World moths. In ethnology and archæology the Duke de Loubat, Henry Villard, J. Pierpont Morgan, B. T. B. and Frederick Hyde and Heber R. Bishop have given most valuable collections and supported expeditions, as the important one of H. Bandelier in Peru; while Mr. Jessup has inaugurated and maintained, and is

now administering, the expeditions to Mexico, Siberia and Alaska. Purchases upon a most munificent scale have secured such large collections as the Sturgis, Emmons, Terry and De Morgan in ethnology and archæology, the Haines in conchology, the Hall in paleontology, the Spang in mineralogy, the Baily and Bendire in oology, the Maximillian and Elliot in mammalogy and ornithology, the superb Elliot library on birds; and innumerable smaller purchases are yearly adding to the beauty and completeness of the cabinets. Perhaps the most astonishing and original exhibit contained in the Museum to-day is that of vertebrate paleontology. Professor H. Fairfield Osborn has practically created this department. He has supported it in its work in the field under Dr. Wortman, and he has brought to its installation a sympathy for the needs of the visitor and student, an unerring sense of correct and attractive arrangement, and he has stamped it with the impress of deep learning.

Amongst the very beautiful objects of the Museum halls, the realistic groups of birds and animals challenge a delighted notice. These admirable extracts from nature show the habitat of the animals reproduced with microscopic care and verisimilitude, the animals themselves in flight or motion or arrested in surprise or interest. The art of taxidermy has taken a high and justly celebrated place in the American Museum of Natural History, and Messrs. Rowley and Smith have felt the responsibilities of their keenly critical position. There are gems of taxidermy from the hand of Jules Verreaux where the apt instinct for anatomical relations reveals the character of the creature, where angularities of structure are not forgotten, and smooth contours are entered by lines of muscular or ligamental modelling. Taxidermists are apt to overstuff; if the subjects are large they are fattened with superabundant straw until, like Falstaff, they are 'mountains of mummy;' if small, converted into rolling pins, or, as Flower says, are 'wretched and repulsive caricatures, out of all proportion, shrunken here, bloated there, and in impossible attitudes.' Taxidermy, like sculpture, is a study of the relations of muscles; with little difficulty it becomes the protean art of making pin cushions.

The Museum of Natural History in London is regarded to-day as the most perfect representation of an ideal museum of natural history in the world; after it the museum in Berlin, and, in about equal rivalry for the second place on the Continent, those of Vienna and Paris. The care with which the first two have elaborated the presentation of groups of birds and mammals afforded the suggestion for the groups now shown in the American Museum. These were at first largely created by the cooperative efforts and skill of Jenness Richardson and Mrs. Moggridge, an Englishwoman who had worked at South Kensington. The taxidermy at all these museums is of no higher order than that displayed in the American Museum of Natural history. The groups are more varied, are larger, and in many cases, as at Paris, are placed in more theatrical relations to the spectators. Such groups compose a feature wonderfully attractive, and are really to a large superficial class of visitors the most appreciated and helpful form of exhibit.

In the British Museum the influence of environment, the modifications of texture, and the progressive changes in dermal appendages and skin, together with ample morphological illustration, supplement these pure nature studies and embody a magnificent lesson in zoology. Such advances Dr. J. A. Allen contemplates in the American Museum in New York.

The detailed or even general description of the collections is impossible in a sketch devoted to blocking out the conformation

simply of this great Museum. They have grown and spread and their multitudinous aspects defy compression within the limits of a reasonable and readable essay. But one characteristic of the present development of the Museum should receive attentive consideration.

President Jessup has, I presume, upon mature deliberation thrown the energies of this institution largely in the direction of ethnographic study. Expeditions have been and are to-day despatched into distant sections of indigenous culture to bring back the implements,the dresses,the idols,art and industry of savage or semi-savage or pre-historic races. Comparative studies in culture, religion, language, myth, art, are to be instituted, and the converging lines of such research are to be directed towards that baffling problem of the origin of the American race. American archæology is to be explored and its many phases, from the Indian arrow head to the Palenque altar pieces and the slightly varying cultures of Toltec, Miztec, Zapotec, Nahuatl and Maya, examined and substantially illustrated.

While it is an affected propriety to say 'the proper study of mankind is man,' and while we may with earnestness recommend the curiosity which hunts diligently for any light which reveals the relations of races, their origin, migration and changes, yet the endless collections of pottery, stone implements, textiles, weapons, industrial work and religion might often seem judiciously discouraged. A museum of natural history cannot conveniently or profitably merge its character into that of a museum of comparative ethnology and archæology. It must retain preëminently its office of revealing the realm of nature rather than that of artifice. It must exhaust its resources in a search for the marvels of the animal and mineral kingdoms, and for the revelations of geology. It must increasingly regard its mission as concerned essentially with the lessons and the beauties which are involved in and which decorate the faunas or floras of the earth and those which challenge our enthusiasm in the marvels of crystals and the story of the globe.

The publications of the Museum embrace a series of bulletins now in its ninth volume, and a series of memoirs scarcely begun. They are liberally exchanged with foreign and domestic societies, with individual workers, libraries and institutions of learning. They comprise a great diversity of subjects and are a record of original work of supreme interest. The library has by growth, exchange and gift reached a commanding size and numbers thirty thousand volumes.

The Museum has formed the most flattering alliances with societies that meet within its walls, and with the University of Columbia, which sustains a course of winter lectures in its lecture hall. It is one station of the free lectures of the people under Dr. Leipziger, and its platform and admirable equipments for illustration, designed by Mr. L. C. Laudy, are in constant requisition for lectures on travel, botany and natural history.

The lectures given by Professor A. S. Bickmore under the auspices of the Department of Public Instruction are first delivered here, and afterwards with the accompanying slides distributed to the State Normal Schools and to the superintendents of education in towns and incorporated villages. The educational activity of the Museum is thus seen to be commendable, and, while scarcely on a level with the superabundant and richly varied instructions given by the Brooklyn Institute, its resources in illustration somewhat over-weigh the tireless ingenuity with which the area of possible knowledge is explored by the directors of the institution at Prospect Park.

Material is being steadily accumulated for original investigations, and in the De-

partment of Zoology such 'Study Series' have reached surprising dimensions. These series are strikingly accumulated in the British Museum, and their important bearing upon the scientific welfare of the Museum was expressed by Professor Flower in these words. He says the Study Series "contains all those exceedingly numerous specimens (in many groups, the great bulk of the collection) showing the minute distinctions which are required for working out the problems of variation according to age, sex, season and locality, for fixing the limits of geographical distribution, or determining the range in geological time. It is this part of the collection that zoologists and botanists resort to, to compare and name the animals and plants collected in expeditions sent to explore unknown lands; to work out biological problems of the highest scientific importance, and generally to advance the knowledge of the science. In fact, these reserve collections, occupying comparatively little room, kept up on comparatively little cost and visited by comparatively few persons, constitute, from a scientific point of view, the most important part of the Museum, for by their means new knowledge is obtained, which, given forth to the world in the form of memoirs, books or lectures, is ultimately diffused over a far wider area than that influenced even by the exhibited portions of the Museum. Indeed, without the means they afford, the order, arrangement and power of imparting knowledge which the galleries possess would not be possible."

With such a compressed summary of the salient features of this Museum, which it is hoped will yearly grow more consummately into the best expression of a museum of natural history, I ask your forbearance, though in asking it I am merely anticipating your natural wishes, in considering how practically helpful this institution is in raising the popular standard of thought or desire. My own views on this question are very simple and emphatic. There are very unnecessary exaggerations of the influence of a museum. Upon some people it simply produces surprise. Its size, the diversity of its contents and the unintelligible nature of its labels produce in them a confusing consternation, consternation in which are discernible some self-reproaches for neglect of their own culture, considerable astonishment at that of others, and a pervading atmosphere of wonder as to 'how much money do you suppose it's worth.' Now this class is numerically large. It includes young, middle-aged and old, and while, of course, upon them, in ratio to their peculiarities of mind and disposition, the survey of well-arranged collections must leave wholesome, pleasurable and, perhaps, instructive impressions, the sum-total of all of their impressions will never materially change one way or another the intelligence of a community. A museum, or the directors of a museum, must indeed remember that it is a place essentially of recreation for the great majority. This recreation is far from unimportant. It is remedial, sanitary and of moral efficacy. But I can scarcely believe that it especially instructs. It opens people's eyes, gives them an increased respect for knowledge, and probably amongst parents fortifies their intention to give their children all the education they can afford to give them. I do think they derive certain emancipating ideas about time and creation, and are made probably a little more receptive of progressive thought. I allude, of course, only to scientific museums. The recreation obtained in art museums is more valuable to this class than that secured in the museum of natural history. The material of the art museum appeals more obviously to the eye, thence to the mind and thence to the memory. It involves so many illusions to taste, reading, association and experience.

The second and remaining groups are included in the number who have met these objects of study in the class room, the lecture hall, are collectors, or from reading or conversation, or any other line of contact feel an interest in the specimens themselves, in their arrangement and in their elucidation. This is a respectable number and from the nature of things is constantly growing. But this observation emphasizes the relation in which the museum stands to education in natural history. The intelligent constituency of a museum of natural history are those who know something about its contents. And the extension of natural history study in the schools or colleges is directly promotive of the interest of the museum. The duty, then, of the museum is unmistakably to justify such extension of study by its own ample and adequate and lucidly prepared collections.

This view receives confirmation in the experience of the Carnegie Museum at Pittsburg. The first sentences of the report for 1896 of this institution contains the following paragraph: "With the opening of the second year of the Carnegie Museum the institution found itself occupying a most favorable situation. Its growth during the first year had been phenomenal. The public mind, however, had not kept pace with its progress. While the attendance was always good, the people seemed to make no serious study of the many interesting collections. This was particularly the case on the part of the younger visitors, who came frequently but seemed rather to take a general view than to make a careful inspection." To awaken the critical interest which seemed absent, the Museum Committee conferred with the Superintendent of Public Schools of Pittsburg, and as a result offered a prize essay competition for the pupils of the high schools and high school classes of the public schools. The competing essay was to take the form of a letter, limited to two thousand words in length, from the various contestants to a friend describing a visit to the Museum. The flattering result of this scheme is thus described in the same report:

"No sooner had the circulars been published in the newspapers and distributed to the pupils than the expected result ensued. The pupils of the two chosen grades flocked to the Museum, accompanied by parents and friends, and the habit of careless sauntering immediately gave place to minute and studious observation. Those who designed to compete for the prizes used their note-books for describing the objects, having been cautioned by the committee's circular against making mere lists of the labels or the use of technical language, and informed that the committee preferred 'an intelligent, comprehensive and general description rather than itemized statement or complete catalogue,' nor was this improvement in the method of studying the museum confined alone to the contesting pupils, for the whole body of visitors was observed to take a deeper interest in the inspection of the objects."

In other words, the collections of the Museum become objects of study, of reflective observation, and probably are memorized as to their nature, meaning and relations when a motive of interest prevails to such an end with their visitors. In the accidental case adduced it was a motive of ambition, with some mercenary considerations partially involved. But the motive that can be most generally invoked is one springing from previous knowledge. We all naturally examine new illustrations of what we have studied, what we have collected, or what we have heard about. The profuse admiration of men and women, boys and girls, in the halls of the Museum, over the shells and the birds, and gems and minerals, means almost nothing. Remove these hysterical eulogists to the outside of

the Museum, distract them for a moment by a mechanical carriage, a street procession or an April shower, and I doubt if the *distinct* recollection of one shell, one bird, one gem or one mineral could be satisfactorily traced upon their minds.

Of course, the Museum helps the great populace; it gives them a pleasant and desirable environment of order and beauty and interest, but its educational power in a specific sense is limited almost entirely by knowledge, previously acquired amongst its visitors, of the things it contains. But let no maleficent construction be given to these words. The Museum of Natural History is a wonderfully helpful adjunct to all forces leading to sanity and happiness. To the most untutored it brings delightful revelations of the variety and the mystery of nature, and to those who love that wide retinue of facts and impressions which the fields and the woods, the tenanted air and the resounding sea, constantly yield, how full and eloquent it seems!

The consecrated attitude of mind which in Wordsworth's Ode on the Intimations of Immortality, expressed its ecstacy in the wonderful lines:

> "And O ye fountains, meadows, hills and groves,
> Think not of any severing of our loves!
> Yet in my heart of hearts I feel your might;
> I only have relinquished one delight,
> To live beneath your more habitual sway;"

or that intensity of absorption with Nature which made the hand of Thoreau pen these salient phrases in his Cape Cod: "We often have to think now of the life of men on beaches—at least in mid-summer when the weather is serene; their sunny lives on the sand, amid the beach-grass and the bay berries, their companion a cow, their wealth a jag of driftwood, or a few beach-plums, and their music the surf and the peep of the beach-bird;" both of these relations to Nature so contrasted, rediscover in the museums of natural history the stimulus and the justification to their satisfying joys.

L. P. Gratacap.
American Museum of Natural History.

GEORGE BAUR.

The telegraphic despatches have brought us the sad information of the death of Dr. George Baur, of the University of Chicago.

About a year ago Dr. Baur was compelled to quit his work and to seek rest. It has been known to some of his friends that his state of health was not improving, but his death must come as a surprise to all. Some of his more intimate friends will doubtless give us a biographical sketch of this young, but already eminent naturalist. The writer, who enjoyed somewhat close association with him for a space of four years, desires to pay a tribute to his memory.

Dr. Baur was a native of Germany and he took his doctor's degree at the University in Munich in 1882. Here he studied histology under Dr. Kupffer and paleontology under the distinguished Dr. Karl Zittel. He had previously spent some months with Dr. Leuckart in Leipzig. He gave special attention to osteology and vertebrate paleontology, and his inaugural dissertation was entitled 'Der Tarsus der Vögel und Dinosaurier.' It appeared in the *Morphologisches Jahrbuch* for 1882.

Unless the writer is in error, Dr. Baur came to this country in 1884. He became assistant to Professor O. C. Marsh, in the paleontological laboratory of the latter at New Haven, and continued in this position until January, 1890. During this period he devoted his energies to the fossil reptiles, a group to which he ever afterwards gave especial attention, and upon which he published a number of papers. During the summer of 1890 he spent some time in western Kansas, where he collected fossil reptiles and fishes for Dr. Zittel. Shortly after leaving New Haven he received a call

to Clark University, Worcester, Mass., where he lectured on his favorite subjects. By this time he had become interested in the problems of geographical distribution of organisms and his attention was turned to the Galapagos Islands. Having succeeded in interesting influential persons in his scheme, he left New York for these islands on May 1, 1891, and arrived at Chatham Island, June 8th. He visited in succession Hood, Barrington, Indefatigable, Albemarle, Duncan, Indefatigable again, Jervis, Albemarle again, James, Chatham again, Tower, Bindloe and Abingdon islands, and everywhere made abundant collections of animals and plants. He had intended to visit all the islands of the group, but tidings of sickness in his family compelled him to hasten home. He reached New York on October 2d.

At the opening of the University of Chicago, in 1892, Dr. Baur was called to the chair of comparative osteology and vertebrate paleontology in that institution, and this he occupied until his death. His age did not exceed forty years. He leaves a wife and four children.

Dr. Baur's contributions to science consist of probably one hundred or more papers. Other and more extensive works were in process of preparation. Among these is an account of the tortoises of North America, which was to have been published by the National Museum. This work must have been completed or nearly so, and will probably appear in due time.

Dr. Baur's especial interest was in the morphology of the vertebrate skeleton. Although he recognized the great value of descriptive osteology, such work alone did not satisfy the demands of his mind. Although he wrote much on vertebrate paleontology, he was the describer of few new genera and species. His constant effort was to discover the relationships of forms and the way in which they had originated. He was thus impelled to study the homologies of the various bones and to attempt to connect them with the skeletons of more primitive forms. In many of his papers we find attempts made to unravel the genealogy of groups and to base classifications on this genealogy. His views regarding the scope and the methods of comparative osteology may be learned from a lecture published in SCIENCE, 1890, Vol. XIV., p. 281.

Some of the parts of the skeleton to which he gave especial attention are the carpus and tarsus, the vertebral column, and the bones of the temporal region. His opinions on all questions resulted from a careful study of the material objects involved, from a comparison of these with one another, and from examination of the views of other scientific men. His ideas were expressed in clear and simple language, quite in contrast with the usual German style, and one reads after him with pleasure and profit, even if one does not agree with him. His acquaintance with scientific literature was extensive, and his papers are usually enriched by a full bibliography of the subject discussed. He possessed an independent spirit, and in the utterance of his opinion he stood in awe of no authority. He had strong convictions; and, possibly, sometimes in the heat of discussion he may have expressed himself with some asperity. Although he maintained his opinions with vigor, he was open to conviction; and an examination of his papers will show that he later held views quite different from those advocated at an earlier period. Dr. Baur's studies on the carpus and tarsus resulted in several papers which appeared in the *Morphologisches Jahrbuch*, *American Naturalist*, SCIENCE, and the *Zoologischer Anzeiger*. His views were summed up in a short paper published in the *American Naturalist* for July, 1885.

In studying the development of the limbs Dr. Baur held that the Amniota which possessed more than five fingers were highly

specialized forms and not primitive ones presenting transitions from the fishes. His view is now probably very generally accepted.

A number of his papers related to the structure and the systematic position of the leather-back turtle, *Dermochelys*. He opposed strongly the views of Cope, Dollo, Boulenger and Lydekker that this reptile froms a suborder distinct from all other living tortoises. He regarded it as belonging to merely a highly specialized branch of the Pinnata, a group which contains our living sea-turtles.

The structure and relationships of the Mosasauridæ form the subject of several interesting papers. In opposition to Professor Cope, who maintained that these extinct reptiles bore special relationship to the snakes, Dr. Baur held that they were true lizards, closely related to the Varanidæ, but modified for adaptation to an aquatic existence. An excellent paper on the structure of the skull of the Mosasauridæ was published in the *Journal of Morphology* for 1892.

As early as 1886 Dr. Baur wrote a paper on the homologies of the bones of the otic and temporal regions. His interest in the subject never relaxed and some of his latest papers were written in a discussion of the subject with Professor Cope.

In the same year above mentioned, 1886, Dr. Baur became interested in the morphology of the vertebral column, and he published a paper of considerable length in the *Biologisches Centralblatt* of that year, stating his conclusions. He gave his adherence to the opinion of Cope, who held that the vertebral centrum in all the Amniota has developed from the pleurocentrum, an element which is found distinct in the Stegocephali. He found confirmation of his views in the vertebral axis of the Pelycosaurian reptiles, in *Sphenodon*, certain lizards, birds and even mammals. He advocated the same views in one of his latest papers.

In the *American Naturalist* for May, 1891, occurs an important paper by Dr. Baur on the reptiles known as the Dinosauria. In a characteristic manner he gives the history and the literature of the subject and his own conclusions. His opinion was that 'the Dinosauria do not exist.' He believed that this group is an unnatural one, and is made up of three special groups of archosaurian reptiles which have no close relation to one another.

Two of Dr. Baur's most important later efforts are probably one entitled 'The Stegocephali,' a phylogenetic study, published in the *Anatomischer Anzeiger* for March, 1896, and one, a joint paper with Dr. E. C. Case, having the title 'On the Morphology of the skull of the Pelycosauria and the origin of the Mammalia,' and appearing in the *Anatomischer Anzeiger*, 1897, pages 109–120. In the first mentioned paper Dr. Baur compares the skeletal structure of the Stegocephali with that of various fishes and comes to the conclusion that the Batrachia took their origin from the Crossopterygia, rather than from the Dipnoi. The second paper was based on the fine materials collected by Dr. Case in the Permian formation in Texas. The authors concluded, on the one hand, that the Pelycosauria are closely related to the Rhynchocephalia and that, on the other hand, they could not have been the ancestors of the mammals. The authors were inclined to regard the Gomphodontia as the ancestors of the mammals.

After Dr. Baur's return from the Galapagos Islands, he devoted a considerable portion of his attention to the study and discussion of the problems which arose from the examination of the materials which he had there collected, and which had to a great extent been turned over to specialists. His conclusion with regard to the origin of those islands was that they had originally been

connected with the continent of America and were the result of enormous subsidence. Previously the opinion was almost universal that they had resulted from elevation and volcanic action. He supported his views in a number of papers and lectures; and, while meeting with strong opposition, he had the satisfaction of making several distinguished converts.

About a year ago we were called upon to mourn the departure of a leader in the study of the beings of long-gone ages, Professor E. D. Cope; now paleontology has suffered the loss of Dr. George Baur, cut off in the midst of a brilliant career.

O. P. HAY.

U. S. NATIONAL MUSEUM.

CURRENT NOTES ON ANTHROPOLOGY.

THE LATEST ASIATIC-AMERICAN AFFINITY.

IT is painful to see good ink and paper wasted to prove affinities between American and Asiatic tribes, when the only fact proved is the ignorance of him who asserts them.

The latest example is M. Ed. Blanc, who in the *Journal de la Société des Américanistes*, of Paris, No. 3, undertakes to exhibit the relationship between the Nahuatl, spoken by the Aztecs, etc., in Mexico and the language of the Avars in the northern Caucasus! He also considers the incidents of this imaginary migration.

When, by turning to General von Erckert's fine volume on the Caucasic languages or the earlier works of Professor F. Müller, M. Blanc could have learned that the Avar (Awarisch) is a well recognized member of the Lesghian linguistic stock and is quite familiar to students of such matters, it is scarcely pardonable that he should have burdened the pages of a scientific periodical with his fantastic hypothesis.

THE STUDY OF LOCAL ETHNOGRAPHY.

PROFESSOR M. D. LEARNED, of the University of Pennsylvania, has undertaken the study of the ethnography of Pennsylvania on lines which it were well to have generally adopted. He distributed circulars of inquiry relating to ethnographic material, such as dialectic peculiarities; ballads; local history, traditions and folk-lore; changes in names of persons and places; collections of books and antiquities; manuscripts, etc.

The answers he has received have been gratifying, and he expects to incorporate the results in a series of publications treating separately each ethnic element, the German, English, Swedish, Welsh, etc. Ethnographic charts will be added 'setting forth the cultural epochs and racial complexion of the present population and indicating the speech boundaries.'

This is in the line of what the proposed 'Ethnographic Survey of the United States' hoped to accomplish. (For further particulars see the *University Bulletin*, Vol. II., No. 4, May, 1898.)

WOMEN AS ANTHROPOLOGICAL STUDENTS.

WE have in Washington the only 'Woman's Anthropological Society' in the world, but by no means all the women who study anthropology.

The roll of French anthropologists contain not a few names of the fair sex who have accomplished notable work. Madame Clementine Royer, of Paris, is one of distinction; Madame Chantre, of Lyon, has published excellent anthropometric material; and in the last *Bulletin* of the Anthropological Society of Paris for 1897 Madame Martin presents an instructive study of the statistics of the population of France in 1895, and Madame Chellier a series of anthropometric observations from Aurès, French Africa.

It might be difficult to name an equal array among the Germans; but in the *Globus*, May 21st, Dr. the Countess von Lin-

den, Assistant in the Zoological Institute at Tübingen, repels with a keen pen and abundant knowledge an attempt of an anthropologist to shove her sex into the background by an appeal to 'the laws of nature.

ON STONE PENDANTS.

THERE is a class of stone relics polished on the surface and pierced with an orifice. They were evidently intended to be worn around the neck. For this reason they are in Europe classed as amulets, with us as 'gorgets.' In the *Prähistorische Blätter*, No. 3, Professor Mehlis describes and figures several found in the Palatinate. They closely resemble American types, and are about two inches in length.

In an excellent article by Professor Sophus Müller in the Mémoires of the Royal Society of Danish Antiquaries, 1897, the author reviews a number of new types of artefacts from the Stone Age. Among them is a series in amber of perforated objects evidently intended to be worn by suspension. The two most remarkable identified by him as amulets are faithful copies of the stone axe of the period; and Professor Müller considers them 'of particular importance as showing that the axe served as a symbol during the Stone Age."

The same fact has been recently demonstrated of some American stone pendants by Mr. F. H. Cushing, quite independently of Professor Müller's observations.

D. G. BRINTON.
UNIVERSITY OF PENNSYLVANIA.

SCIENTIFIC NOTES AND NEWS.

SCIENTIFIC SOCIETIES AFFILIATED WITH THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

THE scientific societies meeting before or simultaneously with the Association and more or less closely affiliated with it are as follows:

The American Mathematical Society will meet on Friday and Saturday, August 19th and 20th, in room 11, Rogers Building, Massachusetts Institute of Technology. F. N. Cole, Columbia University, Secretary.

The American Forestry Association will meet on Tuesday and Wednesday, August 23d and 24th, in Horticultural Hall, 101 Tremont street, Boston, the official headquarters of this Association. Francis H. Appleton, Boston, Mass., President.

The Geological Society of America will meet on Tuesday, August 23d, at the same time and place with Section E. J. J. Stevenson, New York, N. Y., President; H. L. Fairchild, Rochester, N. Y., Secretary.

The American Chemical Society will hold its seventeenth general meeting on Monday and Tuesday, August 22d and 23d. The first session will convene immediately after the organization of Section C of the A. A. A. S., and in the same room, on Monday morning. On Monday afternoon at 4.30 the Society will give place to Section C, in order that the chemists may all have the opportunity of listening to the Vice-President's address before that body. The whole of Tuesday will be devoted to the American Chemical Society, and the remainder of the week to Section C. Charles E. Munroe, Columbian University, Washington, D. C., President; Albert C. Hale, 551 Putnam avenue, Brooklyn, N. Y., Secretary.

The Society for the Promotion of Agricultural Science will meet in Horticultural Hall, 101 Tremont street, on Friday and Saturday, August 19th and 20th; C. S. Plumb, Lafayette, Ind., Secretary.

The Association of Economic Entomologists will hold its tenth annual meeting in the Natural History Building on August 19th and 20th. Herbert Osborn, Ames, Iowa, President; C. L. Marlatt, Washington, D. C., Secretary.

The Botanical Club of the Association will meet at a time to be announced.

The Society for the Promotion of Engineering Education will hold its fifth meeting in room 22 of the Walker Building of the Massachusetts Institute of Technology, August 18th, 19th and 20th. J. B. Johnson, St. Louis, Mo., President; Albert Kingsbury, Durham, N. H., Secretary.

The American Folk-Lore Society will meet

with Section H on Thursday, August 25th. W. W. Newell, Cambridge, Mass., Secretary.

The American Psychological Association will meet with Section H on Thursday, August 25th. Professor Hugo Münsterberg, Harvard University, President; Dr. Livingston Farrand, Columbia University, Secretary.

The National Geographic Society will meet with Section E in the Natural History Building on Thursday, August 25th.

The Botanical Society of America will meet in 26, Rogers Building, on Friday and Saturday, August 19th and 20th. On Friday, at 8 p. m. Professor John M. Coulter will give the address of the retiring President; on Saturday, at 9:30 a. m. and 2 p. m., there will be sessions for reading papers.

A Conference of Astronomers and Physicists, similar to that at the dedication of the Yerkes Observatory, will be held at the Harvard College Observatory on Thursday, Friday and Saturday, August 18th, 19th and 20th.

THE CORAL-BORING EXPEDITION TO FUNAFUTI.

Natural Science takes from the Sydney *Daily Telegraph* the following information regarding the coral-boring expedition to Funafuti which will this summer resume work at the old bore at a depth of 698 feet. Lining pipes, which were on the former occasion lowered to a depth of 650 feet, will be reinserted and extended to the full depth. Boring can be begun on the unproved rock, which is expected to be similar to that met with during the previous 30 feet of the old bore, namely, a white calcareous rock of about the consistency of hard chalk. Professor David expects that the bed-rock will be reached within a depth of 200–300 feet from the bottom of the old bore. Early in August it is hoped that H.M.S. 'Porpoise' will bring from Samoa apparatus for putting down a bore in the bottom of the Funafuti lagoon. Commander F. C. D. Sturdee intends to moor his ship taut at low tide at a spot in the lagoon, which will be about a mile and a-half westward from the main village. A boring platform will be fixed at the bows, whence pipes will be let down to the bottom of the lagoon, which at the spot selected is about 100 feet deep. As soon as the pipes strike the bottom of the lagoon a powerful stream of water will be forced down by means of a flexible hose connected with a large Worthington steam pump. It is hoped that then, if the bottom of the lagoon consists, as is thought probable, of soft and loose sedimentary material, a fair depth may be attained in the few days available for the use of the warship for the purpose. Work will be carried on at the lagoon day and night. It should be possible from time to time, by shutting off the water jet and lowering a sand pump inside the pipes, to obtain small samples of the formation which is being penetrated. If this bore in the lagoon is successful it will much enhance the value of the main bore put down with the diamond drill. The reason why it is proposed that the bore in the lagoon shall be situated only a mile and a-half from the shore, instead of near the center, is that one of the chief difficulties will be the danger of the ship dragging at her moorings. This would be intensified near the center of the lagoon, where the full force of the squalls, trade winds and strong currents would be experienced. At the spot contemplated, however, the warship should be not only out of the main current, but also somewhat sheltered on the coast by the thick belt of cocoanut palms and other trees with which the main island is densely wooded. After finishing the boring experiment in the lagoon, the 'Porpoise' will proceed to the Gilbert Islands, and on her return, early in September, she will be ready to pick up the diamond drill party and convey them to Suva. Should, however, the main diamond drill bore not have been bottomed up to the date of the return of the warship to Funafuti, arrangements have been made by the London Missionary Society which will admit of their steamer, the 'John Williams,' due at Funafuti in November, carrying the party either to Suva or New Guinea, whence they would return to Sydney.

DIETARY STUDIES.

PROFESSOR W. O. ATWATER and Mr. C. D. Woods have published, through the Department of Agriculture, interesting studies of the diets of families living in a congested portion of New York City, together with studies at a mission and a day nursery in the same region. The abstract of their 117-page paper in

the *Experiment Station Record* states that the families were selected as typical of the so-called poor classes usually encountered by philanthropists and mission workers in the congested districts of large cities.

Tables are given showing the kind and amount of food purchased, wasted and eaten, and its cost, composition and fuel value. The results are briefly summmarized as follows:

possible to supply a more nutritious diet at less cost. In many instances, while the foods chosen were inexpensive, they were of such a character that they contained a small percentage of nutrients. Purchasing in quantity, where possible, would also have diminished the cost. Some of the families studied had a sufficient income to enable them to live comfortably if care had been exercised in its expenditure. The

Results of dietary studies—cost and composition of food eaten per person per day.

	Cost.	Protein.	Fat.	Carbohydrates.	Fuel Value.
	Cents.	*Grams.*	*Grams.*	*Grams.*	*Calories.*
Mechanic's family	31	149	128	526	3,955
Carpenter's family	23	148	144	458	3,825
Jeweler's family	18	99	104	296	2,595
Sailor's family	26	139	143	558	4,170
Watchman's family	13	84	92	292	2,400
Carpet dyer's family	16	71	93	310	2,430
Family of carver in a restaurant	13	85	88	261	2,235
Sailors' boarding house	17	95	125	181	2,295
Truckman's family	22	100	129	325	2,935
Sewing woman's family	9	54	41	219	1,500
Shopkeeper's family	15	80	109	351	2,780
Housekeeper's (widow) family	18	93	104	509	3,435
Laborer's family	23	139	119	345	3,090
Porter's family	28	142	142	444	3,720
Printer's family	22	116	124	364	3,120
Truckman's family	22	136	135	595	4,250
Family of caretaker at a day nursery	23	122	158	394	3,585
Builder's family	41	187	219	723	5,770
Do	42	204	264	714	6,220
Salesman's family	16	79	125	347	2,910
Tin roofer's family	20	99	123	327	2,910
Do	16	84	114	227	2,335
Family at a mission	37	143	205	545	4,725
Children at a day nursery (per child per day)	4	30	20	120	800

From the data available the authors do not feel justified in drawing specific deductions. Some general suggestions for the improvement of the dietaries are, however, made. By the selection of cheaper though equally nutritious articles of food, it would as a rule have been

authors believe that permanent improvement must come through education. The people must be taught to select food wisely, and to cook it and serve it in an acceptable manner.

With these results may be compared the report on the dietaries of nine institutions of

Calculated amount and cost of nutrients consumed per person daily.

	Number of persons fed.	Cost.	Protein.	Fat.	Carbohydrates.	Fuel value.
		Cents.	*Grams.*	*Grams.*	*Grams.*	*Calories.*
South Boston House of Correction	523	9.89	153	78	501	3,406
Deer Island House of Correction	1,754	7.34	122	69	624	3,700
Rainsford Island House of Reformation	125	8.07	103	60	414	2,677
Parental School	125	5.29	70	40	346	2,078
Marcella Street Home	333	8.37	95	55	380	2,459
Long Island Almshouse and Hospital	833	7.73	109	48	554	3,164
Charlestown Almshouse and Hospital	145	7.54	71	72	355	2,415
Austin Farm (inmates and employees)	375	12.94	110	114	449	3,327
Pierce Farm (inmates and employees)	194	18.85	138	180	471	4,171

the City of Boston, compiled by Ellen H. Richards and Sarah E. Wentworth (*Institutions Comm., Boston, Rpt., 1896, pp. 206–219*). On the basis of raw materials furnished and number of persons fed the above data were secured.

SCIENCE AND INDUSTRIAL SUPREMACY.

A RECENT writer in the *Revue des Deux Mondes*, M. Raphaël-Georges Lévy, draws a comparison between the chemical industries of Germany and France which is greatly to the disadvantage of the latter, says the *British Medical Journal*. Thus it is stated that the total annual European production of coal-tar derivatives reaches the value of 125 million francs. This is divided up in the following proportions: Germany, 90 millions; Switzerland, 16 millions; France, 10 millions, and England, 9 millions. A single factory at Ludwigshafen employs more technical chemists than are working at the same branch in the whole of England, while the attempts at organized teaching of technical chemistry here have hitherto been ludicrously inadequate. This is wherein our defect mainly lies. The industrious Teuton fastens upon the discoveries of chemists and physicists, and extracts from them the maximum of practical utility. Thus the secret of the aniline dyes was discovered in England; France took up the investigations; but it was in Germany that particular attention was first paid to their mercantile perfection as regards brilliancy, permanence and cheapness. As a natural result, Germany now almost monopolizes their production. The same is true in respect of electricity; the monetary benefit of the researches of Lord Kelvin and the late Professor Clark Maxwell is mainly reaped by the Allgemeine Elektrische Gesellschaft, and the great firms of Siemens, Loewe and Schuckert, which have a combined capital of over 15 million pounds. Almost the only chemical industry which holds its own in England is the manufacture of alkali, and this owes its success to a distinguished pupil of Bunsen's, Mr. Ludwig Mond. M. Lévy, in the article to which reference has already been made, points out that Bunsen and Liebig were the founders of German chemical industry. It was Liebig who devoted his energy and influence to obtaining state aid for laboratories of technical science. From these laboratories issue annually some 800 doctors of science to undertake the direction of factories or the investigation of new products of commercial value. Their education has been assisted by the state, and the knowledge they have acquired will he devoted to increasing, by the surest of all means, the wealth of the nation.

GENERAL.

THE new observatory at Heidelberg, on the Königsstuhl, was dedicated on May 20th. Addresses were made by Professor Kehrer, Prorector of the University, and by the Directors of the Observatory, Professors Valentiner and Wolf. The Observatory belongs to the State and is not a part of the University, but opportunities are offered to students for study and research.

THE Göttingen Academy of Sciences has received from the Emperor's special fund $25,000 for gravity determinations in East Africa.

THE French Conservatoire Nationale des Arts et Métiers celebrated, on June 26th, the centenary of its foundation.

THE Physical-mathematical Section of the Berlin Academy of Sciences has made the following grants: 2,000 Marks to Professor Engler, of Berlin, for the continuation of his monograph on East African plants; 1,500 Marks to Professor Schultze, of Berlin, for the publication of a work on American Hektinellidæ; 1,000 Marks to Professor Brandt, of Kiel, to enable him to accompany the Prince of Monaco in his investigations in the Atlantic Ocean; 1,000 Marks to Professor Burckhardt, of Basle, for investigations on the comparative anatomy of the brain; 1,000 Marks to Professor Kohen, of Greifswald, for the continuation of his investigations on meteoric iron; 600 Marks to Professor Graebner, of Berlin, for the continuation, of his investigations of the formation of the German heaths; 500 Marks to Dr. Kruger, of Charlottenburg, for investigations on the urine; 500 Marks to Dr. Küster, of Tübingen, for his investigations for the coloring matter of the blood and bile; 500 Marks to Dr. Loesner, of Berlin, for the completion of a monograph on the Aquifoliaceæ; 5,000 Marks to Dr. F. Ristenpart, of Kiel, for preliminary studies for

a 'Thesaurus positionum stellarum fixarum;' 1,000 Marks to Dr. Adolph Sauer, of Heidelberg, for the geological investigation of the Aar region; 1,000 Marks to Dr. Schellwien, of Königsberg, for an investigation of the Paleozoic Eastern Alps.

M. Fouqué, professor of 'the natural history of inorganic bodies' in the Collège de France, has been elected a foreign member of the Vienna Academy of Sciences.

Oxford University has given the honorary degree of D.C.L. to Sir John Kirk, F.R.S., known for his administrative work in Central Africa, and to F. C. Penrose, F.R.S., the archæologist.

A portrait of Robert Brown has been presented to Kew Gardens by the Bentham trustees.

Professor Ferdinand Cohn, the eminent botanist, died suddenly at Breslau, on June 25th, of heart disease. He was born in 1828, and obtained a chair of botany at Breslau University in 1859. He was the author of a well-known work entitled 'Die Pflanze.' He had made important contributions to bacteriology, and he wrote a book on 'The Development of Microscopic Algæ and Fungi.'

The *Akademische Revue* reports the suicide, in Comfort, Texas, of Dr. A. Böcking, formerly privat-docent for zoology at Bonn, and known for his explorations in South America. Dr. Böcking had, however, for many years, given up scientific investigation and appears to have suffered many hardships during his life in the West.

Dr. Gümbel, professor of geology, died at Munich, on June 18th, aged seventy-five years.

We called attention to the program of the first Scientific Congress of South America, which was opened at Buenos Ayres on April 11th. We have not received any account of the proceedings of the Congress, but it appears from a brief notice in the *Lancet* that it was highly successful, being attended by some 600 delegates, representing all the countries of South America.

A conference of peers, members of Parliament and representatives of associations interested was held in one of the committee-rooms of the House of Commons on June 23d, on the initiative of Mr. Bryce and Mr. Boulnois, to consider the desirability of making some permanent arrangement for concerted action upon questions relating to: (*a*) the protection of rural scenes and landscapes and town prospects from such disfigurement or repairment as is not justified by consideratians of public utility; (*b*) the provision and maintenance of commons, open spaces, public parks and gardens; (*c*) the preservation of buildings and places which are of peculiar interest by age, beauty or association, whether historical or literary; (*d*) the conservation of wild animals and plants; and generally for 'asserting the importance, on broad grounds of public policy, of maintaining beauty, simplicity, dignity and interest in the aspect of out-of-doors Britain.'

The Italian government has receded from its action of forbidding foreign physicians to practice in Italy unless they acquire a diploma from an Italian university, to the extent of permitting them to treat their own countrymen.

Attention has been called to the fact that plumes worn in the British army are a cause of the destruction of birds. In answer to Sir J. Lubbock, Mr. Brodrick said recently, in the British House of Commons, that orders have been given that plumes composed otherwise than of so-called 'osprey' feathers shall be prepared with a view to obtaining the sanction of Her Majesty to the abolition of the 'osprey' plumes worn by the commissioned officers in certain regiments. The selection of a satisfactory substitute is difficult, and some delay may occur in effecting the change.

Mr. Edward Stanford, London, has published a relief map, prepared by Mr. James B. Jordan, representing an area of 320 square miles with London as the center, in a horizontal scale of one inch to a mile and a vertical scale of one inch to 1,000 feet. The map is made of a stamped steel plate, and is said to be the first attempt to produce topographical models in this manner.

It is stated in the *Auk* that Mr. and Mrs. Herbert H. Smith, well known as expert natural history collectors, through their labors in Brazil, the West Indies and Mexico, are now in

northern Colombia, with several assistants, working under the joint auspices of the Carnegie Museum of Pittsburg, Pa., and the American Museum of Natural History of New York City. Mr. Smith and his party will give special attention to insects, birds and mammals, and will probably remain for a long time in the field, visiting other portions of northern South America after completing their work in Colombia. Messrs. Outram and E. A. Bangs have also an experienced collector, Mr. W. W. Brown, Jr., in the Santa Marta region of Colombia, from whom they have recently received considerable consignments of birds and mammals, preliminary notices of which have already begun to appear. Mr. George K. Cherrie, known for his work in Costa Rica and San Domingo, has been for some months engaged collecting birds and other specimens for the Hon. Walter Rothschild, in the Orinoco districts of Venezuela, where also the brothers Samuel N. and Edward Klages, of Crafton, Pa., have recently established themselves for natural history exploration, partly under the auspices of the American Museum of Natural History. While they will give their attention primarily to insects, a portion of their time will be devoted to birds and mammals.

THE Report of the Missouri Botanical Garden for 1898 contains two papers by Mr. J. B. S. Norton. In the first of these, entitled 'A Coloring Matter found in some Borraginaceæ,' it is stated that in 1897 a small borage, which proved to be *Plagiobothrys Arizonicus*, was sent to the Garden from New Mexico, with the statement that the sheep feeding on it have their muzzles dyed of an intense red color. On further examination of the plant it proved to be alkannin, a dye produced by a number of borages, several of which are commented on in the paper. The second paper, 'Notes on some Plants Chiefly from the Southern United States,' is an account of an examination of material contained in the herbaria of Joor and Jermy, and a number of smaller collections from the Southwest. Mr. Norton has found species of phanerogams which are believed to be new, which he describes and figures in the article.

THE same Report contains an article by Charles Henry Thompson on 'The Species of Cacti Commonly Cultivated under the Generic Name Anhalonium.' These cacti have of late years come into considerable popularity in the collections of amateurs. Mr. Thompson divides them into two genera, *Ariocarpus* and *Lophophora*, the former including what are commonly known as *A. fissuratum*, *A. sulcatum*, *A. furfuracens* and *A. prismaticum*, while the latter includes what are sometimes treated as two forms or varieties of a single species and sometimes as two species under the names *A. Williamsii* and *A. Lewinii*. A simple key and half-tones prepared from photographs of living specimens render the determination of all of the species quite easy.

COMMENTING on the Annual Report of the Field Columbian Museum in an editorial, *Natural Science* says: "We should like to ask why it is that reports which come to us from American museums are always interesting to read, in strong contrast to the reports which come from most similar establishments in our own country and in Europe. It would seem that the writing of these reports is a labor of love to the Americans, while our own curators only do it as a piece of official routine. The consequence is that, in the present Report, as an example, the curator finds hints, suggestions and actual information of value to himself; whereas the Report of, say, the British Museum, contains little but lists of donations and the numbers of specimens registered during the year, with similar matter of no use to anybody in the wide world.

A REUTER telegram from Tromsö says that Mr. Walter Wellman, the American explorer, left on June 27th on board his ice steamer Frithyof for the North Polar regions. Just before his departure from England Mr. Wellman gave to Reuter's representatives an account of his expedition, in which he said that his aim was to reach the North Pole, and also to explore the still unknown northern parts of Franz Josef Land. The party consists of James H. Gore, Columbian University, a geodesist; Lieutenant Evelyn B. Baldwin, who was on the Greenland ice cap with Lieutenant Peary; Dr. Edward Hofma, naturalist and medical officer;

and Mr. Quirof Harlan, physicist, from the United States Coast and Geodetic Survey. Norwegians experienced in Arctic work make up the remainder of the party of ten. Mr. Wellman proposes to reach the Pole by a sledging expedition over the pack ice. At Archangel 75 sledge dogs, procured in Siberia, will be taken on board. At Cape Flora, on the southern coast of Franz Josef Land, two or three men will be left, while others will search for Andrée before the steamer returns in August. Half-a-dozen of the party, with small canvas boats, sledges and dogs, are to push on at once for the northern parts of the archipelago, passing successively the point reached by Mr. Jackson, the spot where Dr. Nansen and Lieutenant Johansen wintered, and Cape Fligely, lat. 82°, reached by Payer in 1874. Somewhere beyond 82° they intend to build a hut to winter in, shooting polar bear, seal and walrus for food. Next spring they propose to set out on a sledge journey toward the Pole. If the conditions are unfavorable they will wait till the second spring. They will have about 120 days in which to reach the Pole, if possible, and return to the land, requiring an average travel of nine to ten statute miles per day. They take with them a rubber pneumatic boat, which inflates with a pump like a bicycle tire, and also a folding canvas boat, built on Mr. Wellman's designs, also sledges of metal, water-tight, so built that they may turn over and over in rough ice or float in the water without injury to their contents. Each dog is to draw one sledge, practically without assistance or driving by the men.

At a meeting, on April 26th, of the select committee of the British House of Commons, on the Department of Science and Art, Sir J. Norman Lockyer was the principal witness examined. He, as reported in the London *Times*, spoke of the insufficiency of the present collection of scientific objects, having regard to the growing necessity of, and demand for, scientific teaching. The Royal College of Science, he pointed out, only taught pure science. The various applications of science to industry were not represented in their teaching at all, and therefore it was not part of their function to make recommendations with regard to this large area of possible museum representation. He was perfectly aware that there was scarcely any branch of applied science which was not represented, more or less, in the present collection, but what he said was that the schemes of representation were very dissimilar and must necessarily remain so. He desired a considerable extension of the science collection. To him it was unthinkable to separate the schools from the museums. It was a much better education for the student of science to be turned into a laboratory, where he could use the apparatus and see other people use it, than to attend lectures. He had taken very great interest in this matter, and some amount of trouble, because it seemed to him that the truth of what Professor Huxley used to preach was coming home to them more and more every day. That was that they were in front of an industrial war, the result of which would be far more serious to them than a mere national war. In this industrial war it was no longer a question of battleships and cruisers. It was a question of schools. The schools were Germany's battleships; they in England had only cruisers. So far as the British fleet was concerned, it was supposed to be twice as strong as the fleets of any two Powers. That might be so, but educationally they were scarcely on a level with Switzerland. They could not hope to fight this struggle for existence unless they had battleships, by which he meant thoroughly developed scholastic institutions.

UNIVERSITY AND EDUCATIONAL NEWS.

REPORT OF THE COMMISSIONER OF EDUCATION FOR THE YEAR 1896-97.

The first volume of the report of the Commissioner of Education for the year 1896–97 has been published. The Commissioner, Dr. W. T. Harris, in his summary, states that 16,255,093 pupils were enrolled in the schools and colleges, being an increase of 257,896 over the preceding year. This increase was entirely in public institutions, there having been a decrease in the total number attending private schools. The Commissioner attributes this decrease to the continuance of what is called 'hard times,' but it seems rather to be due to the improvement of public institutions. Twenty years ago there

were three times as many students in private high schools as in public high schools, whereas now there are more than three times as many students in the public high schools as in the private high schools.

The number of students pursuing liberal studies in colleges and universities was 97,122, a decrease of 255 from the number reported in the preceding year. The number of graduate students is, however, constantly increasing, being in 1896–7 4,919, of whom 1,413 were women. There were 8,173 students of theology, 10,449 students of law and 24,377 students of medicine.

Dr. Harris is especially interested in the introduction of reindeer into Alaska, and describes in some detail what has been accomplished in this direction. He thinks that the reindeer are useful in training the natives as herders and teamsters and in educating them in habits of thrift, which seems considerably to enlarge the scope of the Commission of Education.

This first volume contains 22 special papers of considerable though of unequal value. One of the longest of the articles (158 pp.), entitled 'Some Recent Contributions of Biology, Sociology and Metallurgy to the Curriculum of Colleges endowed by the Federal Government for the Benefit of the Agricultural and Mechanic Arts,' and written by Mr. Wellford Addis, contains rather a curious collection of miscellaneous information. One of the more interesting articles is on college admission requirements, showing the great and needless diversity in our 475 institutions. The requirements vary from those of Harvard and Johns Hopkins down to the college that happens to head the list, which asks for entrance to a course for the A.B. : 'Lessons in English, elementary history of the United States, elementary arithmetic, geography and drawing.' In no department are the entrance requirements so generally unsatisfactory as in science. Could not the A. A. A. S. and the N. E. A. appoint a joint committee that would propose a remedy?

GENERAL.

A NEW Museum of Archæology for the University of Pennsylvania is being erected at a cost of about $500,000. It was begun in January of the present year and will be completed early next year.

GEORGE A. FOWLER, of Kansas City, has given $21,000 to rebuild the agricultural buildings of the University of Kansas, recently destroyed by fire.

THE Rev. Robert Herbert Story, D.D., professor of church history in the University of Glasgow, has been appointed Principal of the University, in room of Principal Caird, resigned.

REV. JOHN WHITNEY has been installed as Rector of the Catholic University of Georgetown, D. C.

WILLIAM DUANE, PH. D. (Berlin), has been appointed professor of physics in the University of Colorado, succeeding Professor W. J. Waggener, who has resigned owing to failing health.

CORNELL UNIVERSITY has recently been called upon to contribute an unusual number of the members of her instructing staff to other institutions. This has been a particularly trying year in her technical and especially her engineering departments. The Sibley College of Mechanical Engineering, for example, loses the senior assistant in its electrical engineering department, Mr. Macomber, who goes to the Armour Institute, of Chicago, as professor of that branch; the senior assistant in the department of machine design, Mr. H. D. Williams, retires to promote a line of his own inventions of promise and importance; the next in seniority in the same department, Mr. A. T. Brügel, goes to the Pratt Institute, to take charge of similar work there; two or three others, instructors, retire to find advantageous appointments elsewhere, while, in the department of experimental engineering, also, the instructor in the study of the 'materials of engineering,' Mr. Houghton, resigns to accept the professorship of mechanical engineering in the Arkansas State University. A number of these positions are, at last accounts, unfilled, and it is expected that special care will be taken to select men of practical experience, as well as of talent and education, to carry on work which is, in all cases, greatly specialized. This training of

young men to special work, usually preparatory to their early promotion into professorships elsewhere, is found, it is reported, to be somewhat trying to the heads of departments, as compelling too frequent changes; although it is most creditable to the college and very helpful to the growing technical schools and college departments into which this output passes.

THE Association of Collegiate Alumnæ has awarded its European Fellowship to Miss Caroline Stewart (A.B. Kansas University '92, A.M. Michigan '95). Miss Stewart held a Scholarship in Germanic languages at Bryn Mawr, in '95–6, and a Fellowship at the same College in '97. The American Fellowship has been awarded by the Association to Miss Caroline E. Furness, Vassar '91, who has been assistant the past three years in the Observatory at Vassar.

THE Women's Education Association of Boston, which awards its Fellowships through a joint committee composed of members of its own organization and the Fellowship Committee of the Association of Collegiate Alumnæ, has this year awarded two European Fellowships of $500 each. The successful candidates are Miss Louise Phelps Kellogg, Wisconsin '97, student in American history; and Miss Katherine B. Davis, Vassar '92. Miss Davis was in charge of the Model Workingmen's Home at the World's Fair and was for a time head-worker at the College Settlement in Philadelphia. The past year she has held a Fellowship in Political Economy at Chicago University, and declined a reappointment to accept this Foreign Fellowship.

A PUBLIC meeting was held in Birmingham on July 1st, to consider the proposal of establishing a university in Birmingham. The principal address was made by Mr. Chamberlain, M. P., who strongly advocated the plan, and the following resolution was carried: "That, in the opinion of this meeting, it is essential that, in the interests of the city and the Midland districts generally, a university should forthwith be established in Birmingham." The resolution was carried. Donations were announced to the amount of £95,244. Included in this was £20,000 from the Birmingham, Brewers' Fund, an anonymous donation of £20,000, £10,000 from Mr. G. H. Kendrick, five donations of £5,000 each, two of £2,000 each, and 21 of £1,000 each. Mr. Chamberlain was amongst those who gave £1,000.

SIR WILLIAM FORWOOD, Chairman of the Library, Museum, Art and Technical Instruction Committee of the Liverpool City Council, laid, on July 1st, says the London *Times*, the foundation-stone of an addition to the fine range of buildings (the Brown Library and Museum, the Picton Reading-room and the Walker Art Gallery) on the north side of William Brown-street in that city. The new structure, which is estimated to cost the corporation close upon £100,000, will provide additional needed accommodation for the Museum (which will then be one of the finest of its kind in the kingdom), besides the Central Technical School. The three lower floors, reached from a separate entrance in Byrom-street, will be devoted to the purposes of the Liverpool School of Science, Technology and Art. In the basement will be rooms for practical instruction in electricity, engineering and various other technical subjects. Above this will be a lecture-hall, capable of accommodating nearly 400 students, besides class rooms for various subjects, and the necessary administrative offices. On the floor above this again will be a number of other class-rooms, adapted for the instruction in mathematics, building construction, etc.; and in a cross gallery on a higher level (isolated from the other portion of the School) will be a properly equipped chemical laboratory and lecture-room.

THERE are this summer 5,606 students matriculated at the University of Berlin, which is more than 1,200 in excess of the registration last summer. There are in addition 678 auditors, of whom 193 are women.

SCIENTIFIC LITERATURE.

L'Electro-Chimie: Prodution électrolytique des composés chimiques. Par AD. MINET.

This little volume comprises two sections. Forty-two pages are devoted to the description of the electrolysis of sodium chloride. Every point of interest to manufacturing chemists is carefully considered and explained in detail.

Methods of preparing the chlorates of sodium and potassium, of purifying aluminium sulphate, of manufacturing persulphates, alkali bichromates, potassium permanganate, sodium hyposulphite, white lead, vermilion, etc., in the electrolytic way, are placed before the reader in a most attractive manner, so that as we proceed we are inspired with a desire to repeat these experiments, but having previously carried out similar schemes for most of the substances mentioned we find pleasure in corroborating the statements of the author, with an invitation to others to embark in this field of investigation.

The second section considers the application of the current to organic substances. The author credits Davy with having been the first chemist to venture into the field, but adds that Kolbe, Wurtz, Bourgoin, Walker, Miller, Weems, Berthelot and others made researches in this direction. Your reviewer would include the name of Mulliken in this list. The efforts of these men, bestowed upon the aliphatic acids and their salts, have been most fruitful, but the author of the work before us is content, and naturally enough, to give certain generalizations and deductions from the pen of Bourgoin, and then branches forth upon the synthesis of alcohol by Lapeyriere in 1880, with brief mention of that of Eisenmann, the decolorization of bark liquors, electrolytic tanning, etc. This section may be said to be entirely technical, but it, as well as the first section, merits the attention of chemists generally, for both contain much valuable matter, concisely expressed and highly suggestive.

EDGAR F. SMITH.

Electro-Metallurgie. Voie humide et voie sèche. Par AD. MINET. Paris, Boulevard St. Germain, 120, Masson et Cie.

The author first defines electro-metallurgy, describes different types of electrical apparatus, and reviews the various laws relating to electrolytes, then outlines the precipitation of copper, lead, silver, bismuth, cadmium, mercury, gold, platinum, iridium, tin, antimony, iron, nickel, cobalt and zinc, giving with each the most suitable composition of bath, the proper current density, the regeneration of the liquors and other data valuable to those engaged in electroplating.

The second section of the book, devoted to electro-metallurgy in the dry way, is most interesting. The metals considered are aluminium, magnesium, sodium, potassium, lithium, calcium, strontium, barium and zinc. A short historical sketch precedes the working conditions laid down for each metal. Taking aluminium as an example, there first appears a general outline for its isolation from the double fluoride of aluminium and sodium; then follow a description of the methods proposed by Minet, Heroult and Hall, with directions as to choice of electrolyte, including its physical properties, as well as the mode of regeneration, and also the electromotive force necessary for the decomposition of the various salts, and hints as to the nature and shape of the vessel intended to carry the electrolyte.

Students of chemistry will read this section with pleasure and profit, and lay aside the volume with the conviction that it brings little which can be criticised and a very great deal which will be helpful to all who wish to pursue this line of study further.

EDGAR F. SMITH.

A Manual of Quantitative Chemical Analysis. By E. F. LADD, B.S., Professor of Chemistry in the North Dakota Agricultural College, and Chemist to the Government Experiment Station, Fargo, N. D. New York, John Wiley & Sons. 1898.

"This little manual is intended for the use of beginners in quantitative analysis. The methods have been selected to advance the student from the simple analysis to the more complex and difficult, and when he has completed the course as laid down here he will be in a position to intelligently use and interpret the advanced works of Fresenius, Crookes and the Encyclopædias." A book which will give a few simple examples illustrating the principles of analytical chemistry can be used with advantage by those who only wish a general idea of chemistry; but it is doubtful whether such a book is useful to one who expects to go more deeply into the subject. He would either have a very slight knowledge of the subject or would have to repeat the work in a more thorough manner.

The first part of this book is given up to analyses of single constituents, while farther on the the student is given methods of analyzing food, water, urine and soils. It is impossible to treat these subjects satisfactorily in a few pages, and the mere mechanical analysis of a few of these products would prove of little value to one who might have to deal with related substances. The chief objection to the book might be summed up in the statement that it is too mechanical.

J. E. G.

The Study of Man. By Alfred C. Haddon, M. A., D. Sc., etc. New York, G. P. Putnam's Sons. 1898. Illustrated. Pp. 410. (The Science Series; Edited by J. McKeen Cattell and F. E. Beddard.)

In examining Dr. Haddon's work it is just to bear in mind that he does not present it as 'a treatise on anthropology or its methods, but merely a collection of samples of the way in which parts of the subject are studied.' It is 'not intended for scientific students,' but for the amateur and the general reader.

It may be pardoned in a reviewer who has followed with admiration Dr. Haddon's thorough ethnographical work to express a sense of regret that the author did not choose a severer model and a higher intention than he has acknowledged in these words. What the 'study of man' needs more than anything else just now is a series of comprehensive text-books, setting forth the methods pursued, the results attained, and the fields of future investigation adopted by and included in the general term Anthropology. It would be possible to write these in a form not repellent to the general reader and yet meeting fully the requirements of the student. It was the error of the series commenced publication by the Appletons that it drifted into small monographs, well enough in their way, but of slight educational value; and education in anthropological matters is what is most lacking at the present epoch.

Returning to Dr. Haddon's 'samples,' the inventory of them includes specimens mainly from two departments of anthropology, somatology and folk-lore. They are the two extremes of the anthropological curriculum, and perhaps for that very reason were chosen. In the former he discusses in a pleasant way the principal measurements in anthropometry, Bertillon's methods, skull-indices, the color-scale in hair and eyes, and the form of the nose. A chapter is devoted to Dr. Collignon's admirable monograph on the ethnography of the Dordogne district. Others take up the evolution of the cart and the origin of the Irish jaunting car.

The latter half of the book is devoted to games and toys, those of children, savages and grown-up people. This is a comparatively recent field of research, and its fruitage promises to be of much greater value than was imagined by the earlier writers. Games are frequently the survivals of sacred ceremonies, and are peculiarly tenacious of early forms and expressions. Of the subjects under this head considered by Dr. Haddon the more important are kites, tops, the bull-roarer, and singing, courting and funeral games. Concerning all of them he collects interesting material and adds to it from his personal observations.

In his last chapter the author reprints the directions of the committee 'to conduct an ethnographical survey of the United Kingdom' appointed by the British Association in 1892, with additional practical suggestions of his own. A thorough index closes the volume.

The illustrations are sufficiently numerous, and include ethnographic maps of England and France, types of skulls, noses, etc., illustrations of vehicles, and of various cards and toys. They are well printed, and the manufacture of the book in general may be commended. As the first number of the 'Science Series' it will be welcomed as a promising contribution to the higher department of popular literature.

D. G. Brinton.

SCIENTIFIC JOURNALS.

The Astrophysical Journal for June, which opens the eighth volume, contains as usual a series of important articles. In the first of these by Professor T. N. Thiele, of the Copenhagen Observatory, discusses the resolution into series of the third band of the carbon band-spectrum. Professor Michelson contributes a further account of his Echelon spectroscope, to which we have already called attention. Notes on the

Zeeman effect from the physical laboratory of Johns Hopkins University are contributed by Messrs. Ames, Earhart and Reese. Other articles are by Professor C. Runge, of Hannover; Mr. W. H. S. Monck and Mr. L. E. Jewell.

THE July number of *The Psychological Review* opens with an article by Sig. Gustavo Tosti, discussing the fields and inter-relations of social psychology and physiology. Professor J. H. Hyslop contributes an article entitled 'Psychical Research and Coincidences,' in which he shows that individual cases of premonition may be explained by normal processes of mind. Professor Chas. H. Judd treats the visual perception of the third dimension. There are shorter articles by Professor Caldwell, on 'Professor Titchener's View of the Self;' by Dr. MacDonald, on 'A Temporal Algometer;' by Professor Baldwin, on 'Social Interpretations;' and by Professor Cattell, criticising Professor Münsterberg's article on the 'Danger from Experimental Psychology.'

THE *American Journal of Physiology* issued on July 1st contains the following articles: 'On intestinal Absorption and the Saline Cathartics,' by George B. Wallace and Arthur R. Cushny. 'The Movements of the Food in the Œsophagus,' by W. B. Cannon and A. Moser. 'A Contribution to the Chemistry of Cytological Staining,' by Albert Mathews. 'Notes on Cetraria Islandica (Iceland Moss),' by Ernest W. Brown Ph.D. 'Variations in the Amylolytic Power and Chemical Composition of Human Mixed Saliva,' by R. H. Chittenden and A. N. Richards, B. A. 'The Venometer Nerves of the Hind Limb,' by F. W. Bancroft. 'An Analysis of the Action of the Vagus Nerve on the Heart,' by L. J. J. Muskens. 'A New Method for the Study of the Isolated Mammalian Heart,' by W. T. Porter.

The Open Court for July contains as a frontispiece a portrait of Lobachèvsky taken from the bronze statue placed recently in the square now bearing his name, facing the University at Kazan, and the number contains an interesting account of the great geometer by Professor George Bruce Halsted.

Under the title 'The Fastest Vessel Afloat' Mr. Cleveland Moffett describes, in the July number of *McClure's Magazine*, the 'Turbina' and a trip upon it in which the extraordinary speed of 40 miles an hour was attained. The writer holds that the Turbine engine will revolutionize steamship travel where there is a plentiful supply of coal.

SOCIETIES AND ACADEMIES.

TORREY BOTANICAL CLUB, MAY 10, 1898.

THE first paper, by Dr. Arthur Hollick and Mrs. Elizabeth G. Britton, was entitled 'A Description of a new Fossil Moss from Seattle, Washington, collected by Professor I. C. Russell.' The paper was read by Dr. Hollick, who also exhibited the original specimen, a fragment sent to Mrs. Britton for identification by Professsr F. H. Knowlton, of the National Museum in Washington. Professor Knowlton supplied the following facts: "The specimen was collected by Professor I. C. Russell in July, 1897, near Cle Elum, Kittletas Co., Washington, and occurs in the Roslyn sandstone; its age is probably lower Miocene or Upper Eocene. It is associated with species of *Lygodium*, *Ulmus*, *Planera* and a number of other beautifully preserved leaves. It is in any case the oldest undoubted moss thus far found in this country. The so-called *Hypnum Haydeni* of Lesquereux is with little doubt a *Lycopodium*." The specimen represents only the tip of a branch, about one-half inch in length; it is sterile and has been compared with figures and descriptions of other fossil American mosses, and differs from them all. It is undoubtedly a new species of the *Hypnaceæ*, probably a *Rhynchostegium*, and will be named for its discoverer, Professor Knowlton.

Dr. Hollick showed a drawing of the fossil species and also several drawings made from living species which it most resembles. None of these, however, are exact equivalents.

In the discussion following, it was remarked by Mr. Hollick that fossil mosses are extremely rare. All specimens known are Tertiary or later, one reported from a Carboniferous horizon being now thought doubtful; but the existence of mosses in Jurassic times is inferred from the existence of an insect then, the present repre-

sentatives of which feed upon mosses. The only fossil moss heretofore recorded from the United States is Lesquereux's *Hypnum Haydeni*, now believed to be instead a species of *Lycopodium*. Fragments from the Pleistocene have been reported from Canada. The species described this evening is probably the first distinct American species. Thirty or more foreign fossil *musci* have been described, many of them members of *Hypnum*, many of them of *Harpidium* and of *Sphagnum*. To this genus *Sphagnum* belongs the only fossil moss as yet known in fruit, a Tertiary specimen preserved in brown iron ore.

Discussion followed regarding the reasons for the rarity of moss fossils, Dr. Underwood, Dr. Britton, Mrs. Britton and the Secretary participating. Dr. Hollick said that, besides the negative reasons presented by lack of extensive search and by the small size of the plant in question, an important reason for the scarcity of moss-remains is the fact that mosses do not shed their leaves. Small plant-remains in Carboniferous rocks occur not in place, but in débris. Were moss-leaves deciduous there would have been greater chance of their accumulation and preservation in such masses of driftage.

The second paper, by Dr. L. M. Underwood, was entitled 'The Species of *Botrychium* of the *B. ternatum* Group.' The paper, which will soon be published, was accompanied by numerous specimens and followed by discussion at length of the principal Eastern representatives, especially of *B. intermedium*.

Mrs. Britton followed with remarks on the Muhlenberg collection of mosses recently transferred from the Philosophical Society of Philadelphia to the Philadelphia Academy of Sciences. They are preserved exactly as Muhlenberg left them, even to the replacing of a knothole. The plants are wrapped in leaves torn from Testaments printed in Low Dutch. With each specimen is preserved the number he had originally given it, the number he had used in sending it to Hedwig, and the name given it by Hedwig.

The bulk of Muhlenberg's ferns went to Willdenow at Berlin.

Among the collections at the Academy of Sciences in Philadelphia, besides those of Schweinitz, Sullivant, Nuttall and Darlington, is that of Pursh, whose herbarium is still a series of scattered sheets, neither mounted nor classified, but with labels supplied in his own hand.

Dr. Britton announced the recent purchase, by the N. Y. Botanic Garden, of the herbarium and botanical collections of Professor Lewis R. Gibbs, of Charleston, S. C., through his daughter, Miss Maria R. Gibbs. The herbarium of Elliott is in bad preservation and much of it gone entirely. The Gibbs herbarium is deemed of special value as illustrative of Elliott's plants.

Edward S. Burgess,
Secretary.

ENGELMANN BOTANICAL CLUB.

The Club met on June 23d at the St. Louis Medical College, fourteen members present.

Mr. Walter Kirchner read a paper on fossil plants of Florissant, Colorado, and exhibited a number of specimens, several of them being new species.

Mr. J. B. S. Norton made a report of the field meet held at Cliff Cave, six miles south of St. Louis, on June 4th. The locality was a wooded ravine with limestone cliffs next the river and some upland woods. The woods may be characterized by *Hydrophyllum Canadense*, *Aralia quiquefolia* and *Carex latifolia*. The character of the limestone out-crop formation may be represented by *Celtis pumila*, *Dodecatheon media*, *Agave Virginica*, *Tecoma radicans*, the latter covering the cliffs. Specimens of the *Agave* with red spotted leaves very close to var. *tigrina*, and compound leaves of *Vitis cinerea*, were exhibited.

J. B. S. Norton,
Acting Secretary.

NEW BOOKS.

Biological Lectures Delivered at the Marine Biological Laboratory of Woods Holl, 1896-7. Boston, Ginn & Co. 1898. Pp. 242.

The Play of Animals. Karl Groos. Translated by Elizabeth L. Baldwin. New York, D. Appleton & Co. Pp. xxvi+341. $1.75.

The Doctrine of Energy. B. L. L. London, Kegan, Paul, Trench, Trubner & Co., Ltd. 1898. Pp. 108. 2s. 6d.